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Eperythrozoon felis: Observations on Incidence and Relationship to External Parasitism in the Cat

BY

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SUMMARY.—A survey was carried out to establish whether Eperythrozoon felis *infection could be demonstrated in cats in the London area and to determine whether this could be associated with the presence of ectoparasites.*

E. felis *was not seen in blood films examined from* 126 *cats.*

A possible source of infection is suggested for the cases seen in the Cambridge area.

Introduction

ORGANISMS attached to the surface of erythrocytes have been reported in blood films from cats examined in the Cambridge area.

Inoculation experiments using blood from cats so infected have reproduced a condition similar to feline infectious anaemia.

The eperythrocytic organism which is seen in annular, coccoid and rod forms has been designated *Eperythrozoon felis* (Seamer & Douglas, 1959). Naturally occurring cases of an infectious anaemia attributable to this organism have not been reported in Great Britain.

Feline infectious anaemia is seen widely in the United States and the organism responsible is morphologically similar to that reported in this country.

Materials and Methods

Whilst the Metropolitan area of London is not entirely comparable with the City of Cambridge and its environs, the conditions of husbandry under which the domestic cat exists are no doubt similar in both cities. It was considered a reasonable assumption that, if *E. felis* infection occurs in the London area, then it should be possible to demonstrate it in blood films from cats submitted for examination at the small-animal clinic of this College. In order to do this an investigation was carried out between the first week in June, 1959, and February, 1960.

Blood samples were obtained as regularly as possible depending on availability, from cats presented at the small-animal clinic for examination.

Details were recorded of sex, age, general bodily condition, evidence of external parasites and of anaemia by examination of the visible mucous membranes.

After previously clipping away the hair, cleaning the skin with a swab moistened with spirit, samples of blood were obtained by venepuncture of the cephalic vein using either a sterile hypodermic needle and syringe or flamed mounted needle. Samples were also obtained from the blood vessels of uteri as the latter were removed at ovarohysterectomy.

A drop of blood obtained by one of the above methods was transferred to a polished, sterile, grease free microscope slide and a thin film made using the standard technique (all slides being sterilised and stored in alcohol prior to use.) Films were then air dried as rapidly as possible, fixed in methyl alcohol for 3 minutes and stained with Giemsa stain, diluted 1:16 and buffered to *p*H 7.2, for one and a half hours. Staining was carried out by inverting the slides in a porcelain staining dish in order to prevent the precipitation of stain particles on the film and so give rise to the appearance of artefacts.

After staining, films were washed, dried and examined for evidence of eperythrocitic organisms, polychromasia, anisocytosis and normoblastosis. This data was then recorded.

Results

In all, 126 cats were examined, the distribution amongst the sexes being as follows: 16 entire males, 104 entire females, 4 neutered males and 2 neutered females.

There was considerable variation in the age, the youngest being 2 weeks and oldest 14 years.

TABLE I
THE AGE DISTRIBUTION OF CATS EXAMINED FOR EXTERNAL PARASITISM AND FOR EVIDENCE OF *E. felis* INFECTION

Age	Number	♂	♀	Neutered ♂	Neutered ♀
0 — 6 months	84	6	78	—	—
7 —12 ,,	14	3	11	—	—
13 —18 ,,	8	1	6	1	—
19mths— 2 years	3	1	2	—	—
2 — 2½ ,,	3	1	2	—	—
2½— 3 ,,	3	1	2	—	—
3 — 3½ ,,	—	—	—	—	—
3½— 4 ,,	3	1	2	—	—
4 — 4½ ,,	—	—	—	—	—
4½— 5 ,,	1	1	—	—	—
5 — 5½ ,,	—	—	—	—	—
5½— 6 ,,	—	—	—	—	—
6 — 6½ ,,	—	—	—	—	—
6½— 7 ,,	1	—	—	—	1
7 — 7½ ,,	—	—	—	—	—
7½— 8 ,,	—	—	—	—	—
8 — 8½ ,,	—	—	—	—	—
8½— 9 ,,	2	—	1	1	—
10 ,,	1	—	—	—	1
11 ,,	1	—	—	1	—
13 ,,	1	1	—	—	—
14 ,,	1	—	—	1	—
	126	16	104	4	2

Examination of the stained smears showed that 32 of the 126 cats (25.3 per cent.) had a blood picture suggesting varying degrees of anaemia. On examining the visible mucous membranes it was found difficult to set a criterion on which to base a satisfactory diagnosis of anaemia; consequently, unless there was marked pallor the animal was not considered anaemic. The number of cats classified by the visual method was 12 out of 126, a discrepancy of 15.8 per cent.

It appeared that the colour of the tongue gave the most satisfactory visual aid to the diagnosis of anaemia. Examination of the mucous membranes of the gums, lips and conjunctivae often showed these to be pale in many normal animals.

If the tongue was pallid then this suggested that the animal was anaemic. If pallor was marked it was accompanied by other symptoms associated with this condition.

From the examination of the 126 cats included in the survey it was considered that little reliability could be placed on the examination of the mucous membranes as a means of diagnosing anaemia in this species.

Of the 32 cats considered anaemic the distribution amongst the sexes was as follows: 28 out of 104 entire females, 2 out of 16 entire males, 1 out of 4 neutered males and 1 out of the 2 neutered females.

The presence of *Eperythrozoon felis* was not demonstrated in any of the blood smears whether from cats showing evidence of anaemia or not.

Data regarding infestation of the cats with ectoparasites showed that, of the 126 examined 76 were parasitised by fleas, otodectic mites or lice or a mixed infestation with two of these. Ectoparasites were not demonstrated on 47 cats and 3 were not include in the estimation as there was some doubt as to their being infested. Distribution of ectoparasites is shown in Table II.

The incidence of external parasitism appeared to be maintained at a relatively constant level throughout the period of the investigation.

In the largest group of any one sex examined, *i.e.* the entire females, 64.7 per cent. were affected, of which 39.3 per cent. showed an infestation with fleas, 30.3 per cent. with otodectic mites, 27.2 per cent. a mixed infestation with fleas and otodectic mites, the remaining 3 per cent. a mixed infestation of otodectic mites and lice. No cat showed an infestation with both fleas and lice.

TABLE II
THE DISTRIBUTION OF ECTOPARASITES AMONGST 126 CATS EXAMINED FOR THE PRESENCE OF *E. felis*

	Sex of Cats ♂	♀	Neutered ♂	Neutered ♀	
Fleas	5	26	—	1	32
Otodectes	0	20	—	—	20
Fleas + otodectes	2	18	1	—	21
Otodectes + lice	1	2	—	—	3
	8	66	1	1	76
Cats showing no evidence of ectoparasites	7	36	3	1	47
Total No. of each group	15	102	4	2	123
*Not included	1	2	—	—	3
	16	104	4	2	126

*Three doubtful as to whether ectoparasites were present.

Discussion

From this investigation it would appear that *Eperythrozoon felis* does not occur in this part of Great Britain neither is it related to the presence or absence of ectoparasites. Should it occur, then the incidence is so low that no animal so affected was discovered during the period of the survey.

A degree of anaemia would seem to occur in cats mainly in the 3 to 12 months age group. This, except in the case of two kittens 2 weeks of age, appeared to bear no relation to the incidence or species of ectoparasite, as shown by the following figures: of the 32 cats considered to be showing an anaemia, 9 had an infestation with fleas, 6 a mixed infestation of fleas and otodectic mites, 1 only otodectic mites and 16 had no parasitic infestation.

As no cases of *E. felis* infection have been detected here it has not been possible to investigate the possibility of transmission *via* ectoparasites. It was of interest to note however that those animals reported by Seamer and Douglas as showing a positive infection all showed evidence of external parasites.

If, as it would seem at this stage of our knowledge, *E. felis* is a new blood parasite of the British cat and appears to be localised in a small area of the country, then is it peculiar to that area or has it

(*Concluded at foot of adjoining column*)

Orthopaedic Surgery in Farm Animals*

BY

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WHILE conducting investigations into the locomotory disorders of farm animals, *i.e.* cattle, pigs, sheep, and goats, during the last 10 years, the present author has been made aware of the large variety of conditions which may affect the limbs of these species. Lameness has long been assumed to be well nigh the prerogative of the equine species so that the vast majority of studies on lameness in animals have been concerned with the horse. By comparison the subject of lameness in cattle and the smaller farm animals has been sadly neglected. Presumably this state of affairs has largely been governed by economic considerations whereby, before World War II, any prolonged, expensive treatment of an individual farm animal was unprofitable and thus rarely entertained. Times have changed, however, and with the tremendously increased market value of all farm stock at the present day the treatment of the individual has become a feasible, and oftentimes a highly desirable proposition. Furthermore, there is a very appreciable loss of farm stock annually as a result of limb disorders and so research into these conditions is decidedly worthwhile.

In order to go some way towards demonstrating the variety of conditions that may be encountered, mention will be made, in a necessarily brief fashion because of limited time, of just 3 locomotory disorders.

Upward Fixation of the Patella in Cattle, and its Treatment by Means of Patellar Desmotomy

Before embarking on a description of the distinctive clinical features of this syndrome it is important that attention should first be drawn to the anatomy of the structures involved.

Anatomy (Cattle)

The patella is a large sesamoid bone which articulates with the trochlea of the femur. Its articular surface is extended medially by an accessory sheet of fibrocartilage which curves over the very prominent medial ridge of the trochlea. Attaching the patella to the tuberosity of the tibia are 3 straight patellar ligaments (Fig. 1). The *middle patellar ligament* is the stoutest and is inserted into the summit of the tuberosity; the *lateral* receives a strong tendon from the biceps femoris muscle, and is inserted immediately postero-lateral to the middle ligament; the *medial* is attached above to the patellar fibrocartilage and has a curved course before inserting one inch medial to the middle ligament. These ligaments can be considered the tendons of insertion of the quadriceps femoris and biceps femoris muscles and transmit the action of the latter to the tibia.

A thin band of tissue extends from the medial condyle of the femur and joins the patellar fibro-

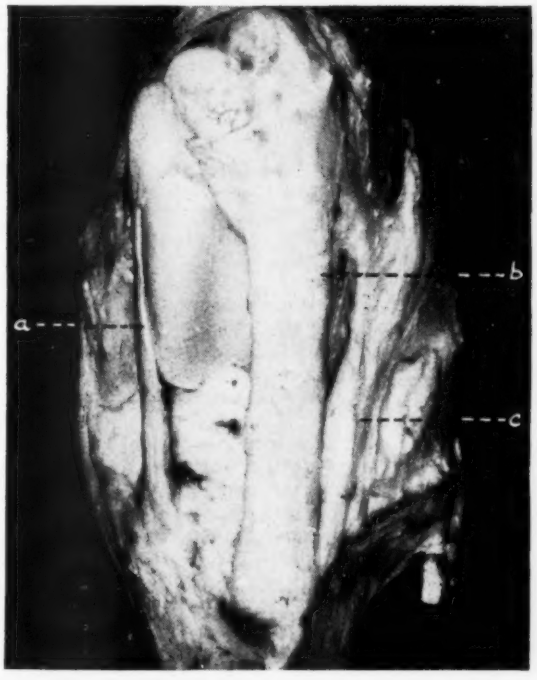

FIG. 1.—Dissection to show patellar ligaments in cattle. a, b, c, indicate the medial, middle, and lateral patellar ligaments respectively.

* Paper delivered to a meeting of the A.V.T. & R.W. on February 26th, 1960.

Eperythrozoon felis.—*Concluded.*

been introduced *via* an infected cat imported from abroad?

In 1958, 285 domestic cats passed into quarantine stations in Great Britain; a figure for 1959 is not yet available but will no doubt be comparable: It would seem highly probable that herein lies the source of infection. That the organism seen in this country is morphologically similar to that reported abroad, in the United States in particular, adds weight to this theory.

Acknowledgments.—I wish to acknowledge the assistance of Messrs. R. C. Frost and K. C. Barnett in providing clinical material for this survey.

Reference

SEAMER, J., & DOUGLAS, S. W. (1959). *Vet. Rec.* **71.** 405.

cartilage; this is the medial femoro-patellar ligament. A similar band is found on the lateral side that goes directly to the patella. These so-called ligaments are in fact extremely difficult to distinguish from the joint capsule.

The anatomical features of the patella attachments in the horse closely resemble those in cattle except for certain details that are not of moment here. A comparison between the action of the stifle joints in these two species is of interest. In the horse when the stifle is fully extended the patella is situated high on the femoral trochlea and the medial patellar ligament can be felt hooking tightly around the medial trochlear ridge; as the joint relaxes the patella comes forwards and downwards and simultaneously, the medial ligament is freed from the ridge. When the stifle joint is in maximum extension in cattle the patella does not ride as high on the trochlea and the medial ligament does not appear to become hooked on to the trochlea ridge.

Signs and Symptoms

To date the present author has seen the condition in 3 cows, from widely separated farms; a Shorthorn, a Friesian, and an Ayrshire, which were 2, 5, and 6 years old respectively. The first was a primipara while the others were multiparous and had calved normally on the previous occasions. The disease in each cow appeared during the terminal stages of pregnancy and followed a closely similar course.

By the time each animal was presented for examination, there was a frankly abnormal action of one hind limb. In retrospect, however, it was recalled that the affected member had appeared to be rather stiff for some weeks previously. The posture of the leg at rest was normal and no evidence could be found in it of bruising, oedema, or pain. When the cow was hastened forwards, the limb at first was merely stiff and then suddenly it became rigidly extended so that the foot was dragged along the ground. After a few strides the leg relaxed. This process of a sudden rigid extension followed by relaxation happened repeatedly during progression. At first, the period of dysfunction was so transient that it was over before the animal could be held for a detailed inspection. The number and duration of the attacks increased rapidly until ultimately, about one month after the onset of symptoms, the affected limb was in a state of permanent rigidity, with the stifle and hock joints in maximum extension (Fig. 2). The patella could not be freed from its position on the uppermost limit of the femoral trochlea by digital pressure but an immediate release could be attained by flexing the fetlock joint and lifting the limb so as to flex the stifle joint forcibly. Whenever the limb was extended manually the patella moved into its fixed position on the trochlea with a loud " plop," and at the same time, the medial straight patellar ligament could clearly be left to hook over the very prominent medial trochlea ridge. There seemed to be little doubt that it was this action of the medial ligament which was the root of the locking of the limb in extension.

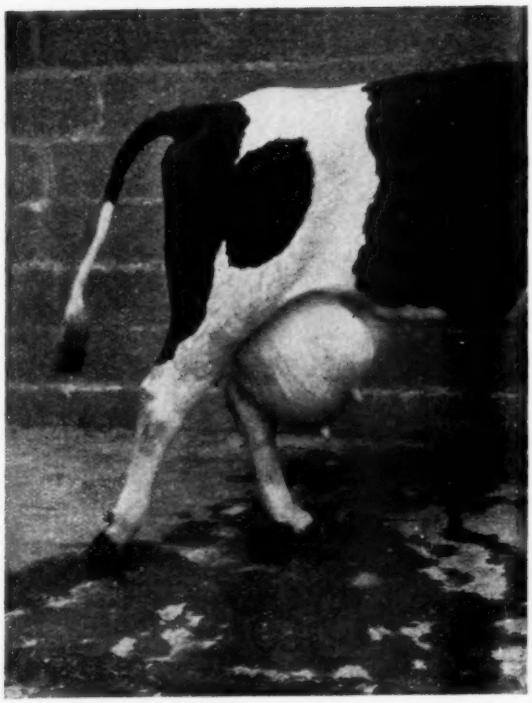

FIG. 2.—Friesian cow. Note hind leg in complete rigid extension, with foot dragging along the ground.

Treatment

The possibility of a natural resolution in these cases appeared to be remote, and it became clear that some surgical measure of correction would have to be attempted. With parturition imminent, however, it was considered advisable to defer operative interference until after calving. Each cow calved normally and a week later was subjected to surgery.

Patellar Desmotomy

The cow was anaesthetised and secured in lateral recumbency. The approach was greatly facilitated by having the affected leg uppermost and raised on a bale of straw. Following the usual pre-operative preparations a vertical incision, some 4 inches long, was made in the skin directly over the medial straight patellar ligament. Subcutaneous tissue was divided by blunt dissection and when the ligament had been exposed it was raised on a tenaculum before being severed near the patellar fibrocartilage with a bistoury. Desmotomy produced an immediate relaxation of the limb and the patella no longer became fixed above the femoral trochlea when the leg was extended manually. The wound was closed with mattress sutures of heavy-duty braided nylon, that included the skin and the subcuticular fascia. No special post-operative measures were required apart from restricting the patient to a clean loose-box

until wound healing was assured, after which time the cow was able to rejoin the herd.

Discussion

Upward fixation of the patella in cattle is a condition that has not previously been recorded in Great Britain. It is, however, extremely prevalent throughout India where it was originally described by Rao (1925). Early workers in India likened it to Stringhalt in the horse (Sankaran, 1927; Parmash, 1929; Ramiah, 1930), and it was Chaudhuri (1931) who first came to the opinion that the basic defect was an upward displacement of the patella. This latter belief has been confirmed more recently by Pillai (1944), Rahimuddin (1944), and Patra (1954). In India it is the working bullock that is most often affected but the condition is also seen in cows and bulls. One or both hind legs may be affected.

Although the exact aetiology is not clear, there are some known factors that require examination. The relative frequency of the disease among the indigenous Indian cattle as compared with its rarity in cattle in the Western Countries naturally leads one to suspect some form of nutritional deficiency. Some support for this supposition comes from data collected by Patra (1954) in which it was shown that in India the incidence is highest in village herds where nutritional standards are low, whereas relatively few cases occur in stock kept at a high level of nutrition.

Naturally this evidence is purely circumstantial and there is obviously scope, in India at any rate, for an attempt to be made to reproduce the disease, which by the way is of considerable economic importance, under certain specific nutritional conditions. As far as the condition in Great Britain is concerned, the affected cows seen by the present author have been from farms where the level of husbandry was above average, but in this context it may be of significance to note that in each case symptoms commenced late in pregnancy, a time when the demands on the dam's metabolism are great.

The theory concerning a nutritional deficiency can be further pursued by a consideration of upward fixation of the patella as it affects the horse. In this species the disease is a well-recognised entity in Europe and in the U.S.A. The clinical features in the two species are practically identical. It is seen most often in the young debilitated horse, and usually both hind legs are affected. It has long been considered that as a consequence of debility there is a general lack of muscle tone in the limbs which leads to a dysfunction of the delicate mechanism controlling extension and flexion of the stifle joint and hence the dorso-ventral movements of the patella. Indeed it has often been noted that symptoms abate when the general condition of the horse is improved either as a result of a more nutritious diet or following treatment for internal parasites. The affliction is also seen occasionally in the older horse and here too there is usually a concomitant lack of health. It has been known to appear suddenly in older horses that have been transported long distances, a fact that is thought by some to be another indication that a deficiency factor is involved. Mitchell (1949) is of the opinion that the condition, in the horse, is a neurological problem. This belief is based on the finding of a neuropathy involving the sciatic and femoral nerves of a Hunter that was destroyed because of recurrent patellar fixation. Clearly this is an aspect that should be explored in the horse and cow.

In the absence of more concrete evidence, the aetiology must for the time being necessarily remain a mystery. Nevertheless, it appears to be reasonable to suspect that the fundamental factor is some as yet undetermined deficiency that arises either as a result of a frankly poor diet or from some strain on the metabolism.

The injection of 5 to 10 c.c. of a weak iodine solution into the femoro-patellar joint of affected limbs is a treatment that was first advocated by Rao (1925) and one that has received widespread adoption in India. An acute inflammation follows the injection and the animal is severely lame for several weeks afterwards. In due course, however, the lameness is said to disappear and the symptoms of patella locking also cease.

Notwithstanding the claims for this injection technique, Patra (1954) has come to the conclusion that section of the medial straight patellar ligament is preferable since the animal is inconvenienced little by the operation. He has referred to 85 cattle treated successfully in this way. In the present author's rather limited experience, patellar desmotomy has also proved to be a successful procedure. All 3 cows treated thus so far have remained sound for a little over 2 years and each has calved again.

Carpal Hygroma in Cattle

The term hygroma signifies a cystic enlargement containing a serous fluid. In cattle, hygromata form most commonly on the anterior aspect of the carpal joint, although they may also be found at various other situations on the limbs, such as the lateral aspect of the tarsus.

Generally speaking, they are acquired as the consequence of some severe trauma which has provoked the effusion of fluid into the subcutaneous tissues. Unless further injury is prevented the condition becomes chronic and a distension of massive proportions may ensue. The latter course is particularly applicable to the lesions that occur on the front of the knee, and the habit that cattle have of resting momentarily on their knees when rising and going down must be largely responsible for this. In passing, it is worthy of mention that the knees of many adult cattle bear witness of repeated trauma by the presence of centrally placed areas of grossly thickened skin which are usually denuded of hair. To a certain extent these areas of fibrosis help to protect the underlying tissues.

Unless it should appear that the blame for carpal hygromata is being unfairly placed on an apparently badly arranged piece of animal behaviour, one should hasten to add that it is the nature of the ground on which the animal lies or walks that is primarily

responsible. Without the presence of concrete, and especially wet, slippery concrete, hygromata would be seen less often. It is for this reason that the lesion is largely encountered in housed cattle.

Before leaving aetiological considerations, mention must be made of the association that for many years has been thought to exist between *Brucella abortus* infection and hygroma formation. The idea of such a relationship stemmed mainly from reports that:—

1. Cattle affected with hygromata were often positive reactors to the agglutination test for *Br. abortus*, and,

2. The isolation of the organism from hygromata in a few cases.

An ideal opportunity to put this possible association to the test presented itself at the A.R.C. Field Station, Compton, where a large number of cattle were gathered for an experiment concerned with *Br. abortus* infection. As a result of the observations that were made over a period of 2 years, it was concluded that the incidence of carpal hygromata:—

1. Was not significantly higher in cattle infected experimentally with *Br. abortus* than in uninfected controls;

2. Was as high in vaccinated cattle as in those unvaccinated, and,

3. Was as high in animals resistant to *Br. abortus* as in those non-resistant (Coid & Vaughan, 1957).

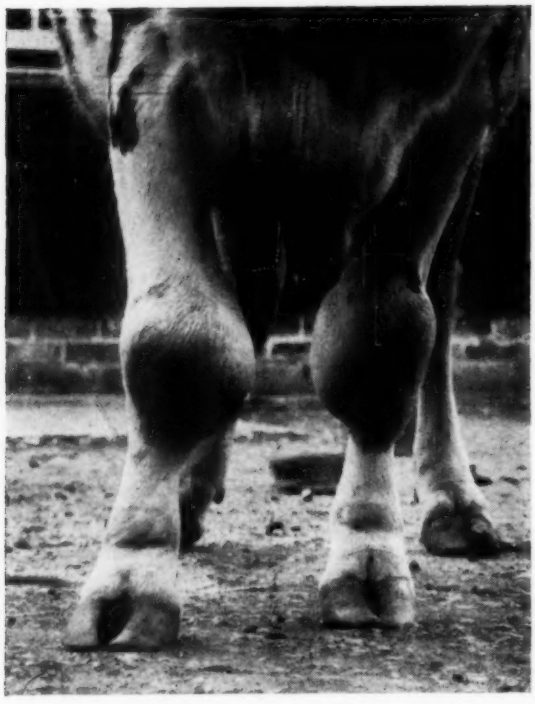

FIG. 3.—Ayrshire cow with bilateral hygromata.

Carpal hygromata are usually soft, benign enlargements and may occur on one or both limbs (Fig. 3). In size, they vary from that of an orange to a melon. In long-standing cases, a remarkable keratinisation of skin sometimes occurs on the anterior surface. Apart from flopping about during progression they appear to inconvenience the animal very little. It occasionally happens that the lesion, probably as a result of a penetration, becomes septic and it then presents a very difficult problem as regards treatment.

Operation

Surgical intervention is most often required when the hygroma is inordinately large, when it becomes infected, or when it is in a show beast and needs to be removed as a disfigurement. Attempts have been made to extirpate the lesion in its entirety. This method requires a long, protracted, and bloody dissection and post-operatively the leg must be splinted if a satisfactory repair is to be achieved. On account of these difficulties the radical procedure has been discarded in favour of a simple drainage. This latter technique can be carried out most expeditiously with the animal anaesthetised and restrained in lateral recumbency. The use of a local anaesthetic is not advised since it is virtually impossible to infiltrate adequately the thickened skin at this site. A circle of skin, 1 inch in diameter, is removed from the upper pole of the swelling. Blood-stained fluid plus quantities of chondroids escape and the "bag" rapidly deflates. A similar opening is made at the most distal point of the sac and a length of sterile gauze is used to connect the wounds so as to keep them patent. During exploration, the hygroma will be found to be a multilocular structure and in order that drainage should be complete, it is important to break down as many of the interlocular walls as possible.

Dead space is occluded by compressing the loose skin to the carpus with a tight bandage. The seton is removed in 7 to 10 days and at this time the swelling is hard and painful. Over the following 4 to 6 weeks, however, it subsides until only a mere thickening of the skin remains (Fig. 4 overleaf).

Amputation of the Digit in the Pig, Sheep, and Goat

The removal of a claw from a fore or hind foot is an operation that has become a commonplace procedure in cattle. By far the most frequent reason for amputation is the presence of a suppurative arthritis of the corono-pedal joint. There is no need, however, to enlarge on this condition in cattle as it has in the past been paid considerable attention. Suffice it to say that in the uncomplicated case, that is, before the pus has spread to other interdigital joints or tendon sheaths, there is an excellent prospect of the animal rejoining the herd in a comparatively short space of time after amputation.

Suppurative corona-pedal arthritis is also seen in the pig, sheep, and goat and in the present writer's experience amputation of the affected digit meets in many cases with a satisfactory outcome. The corono-pedal joint becomes infected by pus that has

FIG. 5. Right forefoot of Large White Boar. Note sinus formation just above coronet.

FIG. 6. Antero-posterior radiograph of the foot seen in Fig. 5, showing a coronopedal arthritis.

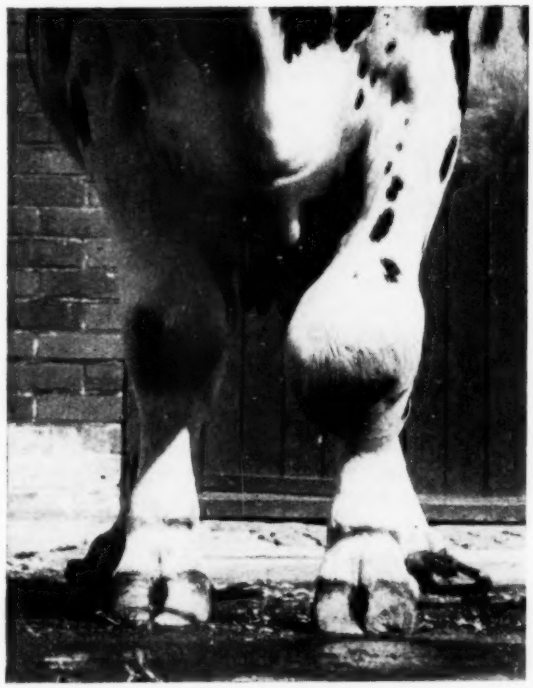

FIG. 4.—Same cow as in Fig. 3, 5 weeks after drainage operation on right foreleg; opposite leg untreated as a control.

tracked from some septic focus elsewhere in the claw. The initial lesion is either an injury to the tissues in the interdigital space or a penetrating wound in the hoof itself.

There is usually a history of an acute lameness of several weeks' standing that has failed to respond to local treatment to the hoof, *i.e.* poulticing and paring to drain pus, or the parenteral administration of chemotherapeutic drugs and/or antibiotics.

Little weight is taken by the affected hoof and the general loss of bodily condition is ample evidence of a period of prolonged pain. In some cases, there are numerous sinuses, or one large opening, in the skin on the antero-lateral aspect of the coronet, from which pus is discharged and which on probing will be found to communicate with the corono-pedal joint (Fig. 5). These coronet wounds are frequently erroneously thought to be merely superficial in nature and are initially treated as such with the result that the detection of the underlying lesion is delayed.

Should the suppurative process spread posteriorly from the corono-pedal joint to the region of the navicular bone and the deep digital flexor tendon it frequently happens that the insertion of the latter into the semilunar crest of the os pedis is destroyed. As a result, the toe of the affected claw tends to turn up and thereby provides a useful diagnostic feature. Radiographic examination of the foot can also be used to confirm the presence of an arthritis although it has to be remembered that those pathological changes in the joints that are demonstrable radiographically are not present in the early stages of the disease (Fig. 6).

Operation

The anaesthetic of choice varies with the species and whether the procedure is to be performed under field or hospital conditions. It has been usual when on farms to anaesthetise the pig with pentobarbitone sodium given intravenously; the goat and sheep are more easily restrained and routinely have been given chlorpromazine hydrochloride intravenously 10 minutes before the operation, followed by the infiltration of the operation site with local anaesthetic.

The level of amputation has been the same in each species, namely, from the distal extremity of the os suffraginis. The initial skin incision encircles the coronet, including any sinuses that may be present. To reach the suffragino-coronal joint level the skin is reflected upwards by dissection. It is preferable to sever the bone with a saw rather than with bone-cutting forceps as the latter tend to shatter the bone. Haemostasis is achieved with a tourniquet during the operation and afterwards by applying a pressure bandage. The wounds heal readily so that within 3 to 4 weeks all dressings can be dispensed with.

Naturally the success of an operation such as this on a limb is bound to be measured by the eventual capabilities of the patient, and from this it is decided whether or not the procedure is worthwhile economically. From experience gained so far, the present author has found that amputation of a claw in animals of these 3 species has a great deal to recommend it. In two certain instances, a valuable Large White Boar and a pedigree Southdown Ram were saved from slaughter.

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OPENING OF NEW PHARMACEUTICAL PLANT

On May 17th, Merck, Sharp & Dohme Ltd., inaugurated their new pharmaceutical plant at Hoddesdon, Hertfordshire.

The guests toured the buildings which provided impressive evidence of labour-saving devices, modern approaches in the pharmaceutical industry and excellent working conditions.

The speakers at the lunch were Dr. Vannevar Bush, Mr. J. T. Connor and Mr. T. W. Raymer.

I—A New Method for Critical Evaluations of Anthelmintics Used for Treatment of Lungworms

BY

J. VODRAZKA

II—Critical Tests with Cyanacethydrazide Against the Sheep Lungworms—*Dictyocaulus filaria* and *Protostrongylus rufescens*

BY

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SUMMARY.—1. *A novel method of performing critical anthelmintic tests against certain lungworms of ruminants is described. After total tracheotomy the end of the severed wind-pipe is inserted into a tube to which is attached a gauze collecting bag.*

2. *The method was used to estimate precisely the effect of subcutaneous injection of cyanacethydrazide in* 10 *per cent. solution at various dose rates against* Dictyocaulus filaria *in sheep with the following results :—*

(*a*) 15 *mg. per kg. once—*79.5 *per cent. effective in* 15 *sheep (mean worm burden* =11).

(*b*) 15 *mg. per kg. three times on successive days—*93.7 *per cent. effective in* 39 *sheep (mean worm burden* =60).

(*c*) 30 *mg. per kg. once—*76.5 *per cent. effective in* 8 *sheep which had previously had antimony treatment (mean worm burden* =62).

(*d*) 40 *mg. per kg. once—*98.3 *per cent. effective in* 9 *sheep (mean worm burden* =41).

3. *There was no anthelmintic effect against co-existent infestations of* Protostrongylus rufescens.

4. *Injections of* 15 *mg. per kg. of cyanacethydrazide in* 10 *per cent. solution caused slight local reactions in a few sheep. At dose rates of* 30 *or* 40 *mg. per kg. about half the animals showed slight to moderate excitement for* 1 *to* 5 *minutes after treatment.*

PART I

Introduction

A WHOLLY satisfactory method for comparing the total number of lungworms removed from an animal by treatment with the number remaining afterwards has not hitherto been developed.

The method used by Walley (1957), and reported by Ozerskaja (1958) as being practised by Sul'c with little success as early as the 1930s, depends on inserting a tube into a hole made in the trachea and catching the expelled worms in a bag fastened to the outer end. This method has the defect that some worms may be able to work their way up between the inserted tube and the trachea wall into the pharynx and so pass out of the host unrecorded. Walley (1957), overcame this difficulty in a few of his animals by occluding the trachea above the inserted tube.

Author's Method

The present author has developed this technique further. He practises total tracheotomy and inserts the whole end of the severed trachea into a plastic tube, securing it with a silk thread as shown in the photograph (Fig. 1).

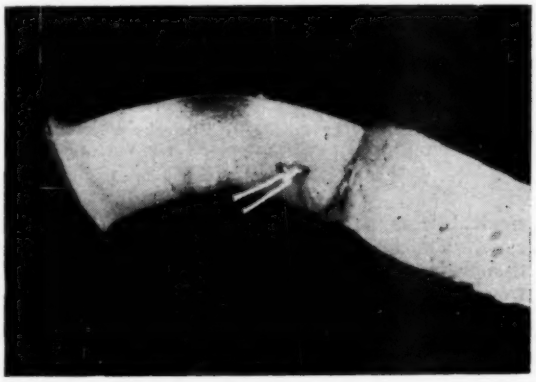

FIG. 1.—To illustrate the method of inserting the whole end of the severed trachea into a plastic tube.

The whole operation, which takes about 10 minutes, is done on sheep under general anaesthesia (thiopentone-barbitone). The tubes made of "Vinidur," which is readily shaped when heated, are bent to an angle of 120° to 150° and are 6 to 8 cm. long. Their diameter ranges from 18 to 25 mm., or more for adult animals, and in selecting the size required it is essential to allow for post-operative swelling, otherwise superficial necrotic changes develop on the inserted end of the wind-pipe, although they do not interfere with the anthelmintic test results. The tube shown in the illustration (Fig. 1), is an example of one which was too narrow, and there is always the risk that such air outlets may become blocked by copious discharges and suffocate the animal.

A series of 119 sheep have been operated upon in the way described, the end of the trachea anchored into the tube and the wound closed, and only 12

died within 72 hours. Some of these probably succumbed due to their very weak pre-operative condition whilst others died of suffocation because the gauze bags attached to the outer-ends of the tubes became blocked by mucus and moisture. Mortality from this cause was reduced by inserting a metal ring into the wall of the gauze bag so that it remained stretched and drier, and by changing the bags 3 times a day. A similar method to the one described has also been used successfully in cattle.

To check the natural rate of elimination of lungworms from untreated sheep, 3 animals were bagged for 3½, 7 and 9 days respectively. Although these sheep were found at subsequent *past-morten* examination to contain 54, 81 and 86 *Dictyocaulus filaria*, not a single worm had been expelled into the bags over the test period. In this connexion it should be observed that animals subjected to total tracheotomy are quite unable to cough and it may be that they do not expel lungworms as readily as normal subjects, since the ciliary action of the respiratory tract mucous membrane receives no violent expiratory assistance.

PART II

Introduction

Following the discovery by Walley (1957) that cyanacethydrazide has marked anthelmintic properties against some species of lungworms living in the bronchial tree, the drug was tested by a number of other workers including the present authors (Vodrázka *et al.*, 1958 and 1959). Their results fully confirm the original findings. Vodrázka *et al.* (1959) found in the case of sheep moderately to heavily infested with *Dictyocaulus filaria* that subcutaneous injections of 15 mg. per kg. of a 10 per cent. solution of cyanacethydrazide on 3 successive days significantly reduced the number of larvae found in the faeces of all but 2 of 19 animals. *Post-mortem* examination of these sheep 3 weeks after treatment showed 8 to be completely negative, 7 more to be carrying only 1 to 4 worms and the remaining 4 to be still infested by 11, 23, 16 and 24 *Dictyocaulus* respectively. The method employed gave no accurate data for the number of worms removed and therefore no figures for percentage efficiency of the drug could be calculated.

Results of Trials Employing the Critical "Total Tracheotomy" Method

A larger series of trials was undertaken using the critical method, the technique of which was described in the previous paper.

First Trial

The first trial (Table I) was done on 15 sheep with fairly light Dictyocaulus burdens ranging from 3 to 27 worms per animal. A single subcutaneous dose of 15 mg. per kg. cyanacethydrazide in 10 per cent. solution removed 79.5 per cent. of these parasites and completely disinfested 60 per cent. of the animals. In 4 of the sheep, numbers 1, 2, 3 and 6, the effect was poor. Three of these failures were associated with extensive consolidation of lung tissue but there was no apparent reason for the fourth one.

Second Trial

The next test (Table II) sought to improve on the first results by repeating the dose of the drug on 3 successive days. The batch of 39 sheep treated were more heavily infested than before and their lungworm burden averaged about 60 worms per animal. Only 4 sheep had fewer than 10 worms whilst 5 carried more than 100 and one sheep (No. 48) had no less than 260 parasites. The dosing expelled 93.7 per cent. of the 2,350 worms present and 51 per cent. of the sheep treated were found to be completely free from lungworms when slaughtered, including one (No. 32) which had carried 152 of them.

As before the worst result (No. 45), was associated with lung consolidation and it is interesting to note that 48 worms were found in the left lung, which was

TABLE I
CRITICAL TESTING OF CYANACETHYDRAZIDE 15 MG. PER KG. S.C. IN 10 PER CENT SOLUTION AGAINST *Dictyocaulus filaria* IN SHEEP

Sheep Number	Live weight (kg.)	Worms found in bags—days after tracheotomy					Worms expelled	Worms found in the lungs	Effectiveness per cent.
		1st	2nd	3rd	4th	5th			
1	27	7	3	1	2	0	13	14	48·1
2	25	2	2	0	0	0	4	6	40·0
3	26	3	2	3	0		8	8	50·0
4	27	9	2	3	0	0	14	1	93·3
5	27	3	0	0	0	0	3	0	100
6	28	4	2	0	0		6	7	46·1
7	30	11	7	0	0	0	18	0	100
8	30	21	3	0	0	0	24	0	100
9	29	5	2	1	0	0	8	0	100
10	30	7	1	0	0	0	8	0	100
11	33	13	1	0	0	0	14	0	100
12	34	2	2	0	1		5	1	83·3
13	25	3	2	0	0		5	0	100
14	31	8	2	0	0		10	0	100
15	23	3	1	0	0		4	0	100
Total		101	32	8	3	0	144	37	79·5

TABLE II
CRITICAL TESTING OF CYANACETHYDRAZIDE AGAINST *Dictyocaulus filaria* IN SHEEP 15 MG. PER KG. S.C. IN 10 PER CENT. SOLUTION, THREE TIMES AT 24 HOUR INTERVALS

Sheep number	Live weight (kg.)	Worms expelled in days (after the 1st treatment)						Worms expelled	Worms found in lungs	Effectiveness in per cent.
		1st	2nd	3rd	4th	5th	6th			
16	22	19	16	12	2	1	0	50	0	100
17	23·5	54	19	13	2	0	0	88	10	89·7
18	27	73	12	8	0	0	0	93	2	97·8
19	23	55	5	1	0	0	0	61	0	100
20	24	19	2	7	0	died	died	28	0	100
21	34	17	9	6	0	0	0	32	3	91·4
22	27·5	21	3	4	0	0	0	28	0	100
23	24	30	16	17	0	0	0	63	6	91·3
24	31	36	8	1	0	0	0	45	2	95·7
25	31	40	21	0	0	0		61	12	83·5
26	24·5	36	31	10	0	0	0	77	0	100
27	28	78	35	20	0	0	0	133	11	92·3
28	26	38	6	10	0	0	0	54	0	100
29	19	10	11	0	0	0	0	21	2	91·3
30	21·5	14	24	9	3	0	0	50	0	100
31	23·5	21	61	28	0	0		110	3	97·3
32	26	55	70	11	16	0		152	0	100
33	26	102	21	18	0	0		141	2	98·6
34	13	36	8	2	0	0	0	46	3	93·8
35	22·3	16	0	0	0	0	0	16	2	88·8
36	34·2	51	35	0	0	0		86	0	100
37	15·5	0	4	0	0	0	0	4	0	100
38	16·5	15	17	2	0	0	0	34	0	100
39	17	36	14	11	0	0		61	0	100
40	18·5	11	23	6	0	0		40	0	100
41	18·5	29	7	5	0	0	0	41	0	100
42	22·3	25	7	2	0	0	0	34	0	100
43	20	7	11	11	0	0	died	29	0	100
44	21	4	4	3	0	0	0	11	2	84·6
45	26·5	9	13	35	3	0	0	60	58	50·8
46	17	3	3	0	0	0		6	0	100
47	21	12	32	21	3	0		68	14	82·9
48	29	108	93	25	24	3	0	253	7	97·3
49	21·5	12	12	2	0	0	0	26	0	100
50	21	19	7	8	2	0	0	36	5	87·8
51	31	8	0	2	1	0	0	11	2	84·6
52	31	0	1	0	0	0	0	1	0	100
53	24·5	0	1	0	0	0	0	1	0	100
54	18·5	34	11	6	0	0	0	51	2	96·2
Total		1,153	673	316	56	4	0	2,202	148	93·7

the more seriously affected of the two, and only 10 worms on the right side. It was observed that the worms expelled into the bags in the first 24 hours after treatment were more active than those appearing later.

Third Trial

The third experiment (Table III) was a test of the effect of the more economical system of giving a larger single dose instead of 3 smaller ones. A single subcutaneous injection of 30 mg. per kg. of 10 per

TABLE III
CRITICAL TESTING OF CYANACETHYDRAZIDE AGAINST *Dictyocaulus filaria* IN SHEEP WITH A SINGLE DOSE OF 30 MG. PER KG. S.C. IN 10 PER CENT. SOLUTION

Sheep Number	Live weight (kg.)	Worms expelled in days				Worms expelled	Worms found in lungs	Effectiveness in per cent.
		1st	2nd	3rd	4th			
55	16	77	14	0	0	91	10	90·0
56	20	18	9	1	0	28	12	70·0
57	20	45	6	0	1	52	27	65·8
58	18	74	21	died	died	95	37	71·9
59	16	45	5	0	0	50	9	84·7
60	20	21	0	0	0	21	0	100
61	28·5	17	1	0	0	18	2	90·0
62	18·5	26	0	0	0	26	20	56·5
Total		323	56	1	1	381	117	76·5

cent. solution of cyanacethydrazide was employed in the treatment of 8 sheep which were more heavily infested than in the first trial. Pathologic changes in the lungs of these animals were also more pronounced especially in numbers 56, 57, 60, 61, 62.

In the 4 days after injection of the drug a total of 381 Dictyocaulus were expelled but 117 remained to be discovered at subsequent *post-mortem* examination, so the anthelmintic efficiency was 76.5 per cent. Only 1 of the 8 sheep treated was found to be free of infection when killed.

(Note that the sheep in this trial had been treated, unsuccessfully, 3 to 5 days beforehand with an antimony preparation.)

Fourth Trial

Another 9 sheep were treated with a still larger single subcutaneous injection of 40 mg. per kg. cyanacethydrazide and the results obtained are shown in Table IV. After treatment only 6 worms of the original burden of 371 remained to be found at autopsy and 7 of the 9 sheep had no worms left at all. The 98.3 per cent. removal of Dictyocaulus was obtained despite the secondary changes present in the lungs of all except one of the animals.

Summary of Results

Table V summarises the results obtained in the 4 critical tests described above.

Action of Cyanacethydrazide Against *Protostrongylus rufescens*

Some of the sheep in the *Dictyocaulus filaria* experiments also carried an infestation of Protostrongylus. The anthelmintic results obtained against this species were recorded and are summarised in Table VI. The drug was ineffective against these worms.

Discussion

Application of the newly developed critical test for assaying the effect of anthelmintics against sheep lungworms confirmed that cyanacethydrazide is a valuable drug for removing *Dictyocaulus filaria*.

TABLE IV
CRITICAL TESTING OF CYANACETHYDRAZIDE IN A SINGLE DOSE OF 40 MG. PER KG. S.C. IN 10 PER CENT. SOLUTION AGAINST *Dictyocaulus filaria* IN SHEEP

Sheep Number	Live weight (kg.)	Worms expelled in days			Worms expelled	Worms found in lungs	Effectiveness in per cent.
		1st	2nd	3rd			
63	48	21	2	0	23	0	100
64	42	18	2	0	20	0	100
65	49	14	2	0	16	0	100
66	18·5	5	0	0	5	0	100
67	19·5	55	1	0	56	0	100
68	20	16	0	0	16	2	88·8
69	15·5	27	11	0	38	4	90·4
70	20	108	19	0	127	0	100
71	27	61	3	0	64	0	100
Total		325	40	0	365	6	98·3

TABLE V
COMPARISON OF RESULTS OF CRITICAL TESTS WITH CYANACETHYDRAZIDE IN SHEEP AGAINST *Dictyocaulus filaria*

Experimental group No.	No. of sheep in group	Dose of cyanacethydrazide s.c. in 10% sol.	Range and average number of parasites in each group	Expulsion of worms in days after dosing										No. of parasites expelled / non-expelled	Percentage of worms removed	No. of sheep rid of parasites	Percentage of animals rid of parasites
				1st		2nd		3rd		4th		5th					
				No.	%	No.	%	No.	%	No.	%	No.	%				
1	15	15 mg. per kg.	3–27 11·4	101	70·1	32	22·2	8	5·5	3	2·1	—	—	144/37	79·5 40–100	9	60
2	39	15 mg. per kg. on 3 successive days	1–260 60·2	1153	52·3	673	30·6	316	14·3	56	2·5	4	0·2	2202/148	93·7 50·8–100	20	51·2
3	8	30 mg. per kg.	20–132 62·2	323	84·7	56	14·7	1	0·26	1	0·26	—	—	381/117	76·5 56·5–100	1	12·5
4	9	40 mg. per kg.	5–122 41·2	325	89	40	10·9	—	—					365/6	98·3 88·8–100	7	77·5

TABLE VI
CRITICAL TESTING OF CYANACETHYDRAZIDE AGAINST *Protostrongylus rufescens* IN SHEEP

No. of sheep	Dosage mg. per kg.	Worms harboured in animals	Average per sheep	Worms expelled/ non-expelled	Percentage of worms removed
5	15 on 3 successive days	11–54	23	0/115	0
2	30	5 and 36	20·5	3/41	6·8
5	40	12–94	49·6	0/248	0

The data given in Tables I to V shows that the best effects were obtained by giving 15 mg. per kg. subcutaneously on 3 successive days or, alternatively, by giving one dose of 40 mg. per kg. by the same parenteral route.

In the second trial (see Table V) large numbers of worms remained to be expelled by the second of the 3 treatments and this confirms the view of Walley (1957), that repeat dosing of heavily infected stock is desirable. This may not be necessary if a large single dose such as 40 mg. per kg. is used as in the fourth trial (Table IV). In that case 89 per cent. of the total of lungworms removed were expelled in the first 24 hours and virtually all the rest by 48 hours. This particular group consisted of only 9 sheep and the good results require confirmation since, if it can be produced consistently, it will hardly be necessary to recommend more than one treatment at the high dose rate. However, the results in experiment 3 (Tables III and V) give the impression that a high dose rate, in this case 30 mg. per kg. once, may not always be outstandingly successful in fairly heavily infested animals.

The efficiency of cyanacethydrazide against immature Dictyocaulus was estimated to be about 10 per cent. less than that against adults judging by the numbers found in the bags and at *post-mortem* examination.

Comparison of results obtained by the authors with other anthelmintics indicated that 0.4 ml. per kg. of Lugol's solution intratracheally was about ¼ as active as cyanacethydrazide and so was a single intramuscular dose of diethylcarbamazine at the rate of 50 mg. per kg. in 10 per cent. solution. Antimosan had no effect (these results will be published elsewhere).

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NOTE.—British readers may be interested to learn the definitions of the terms "extensefficacy" and "intensefficacy" which derive from the book by Sul'c (1933), quoted in the above list of references, and which appear so frequently in abstracts from East European literature. The former term indicates the percentage of animals completely cured and the latter the percentage of parasites removed. These expressions were employed by the authors of the present papers but were altered prior to publication to conform with English usage.

FIFTY YEARS AGO

A Presidential address to the Liverpool Veterinary Society included the following:—

"Most men join the profession no doubt from their love of animals, and given a private income of a few hundreds a year, I declare there is no profession has more attractions, but I am afraid not many of our members are in this happy position; therefore I say it is almost imperative for us to consider soberly what difficulties appear to be in front of us and try to think what may be done to help our prospects, which are none too brilliant unless we waken up.

"First let us consider what financial dangers threaten us.

"They are all connected with motors. We are becoming I think a less horse proud nation than we were, all through motors. Formerly an owner was proud to sit behind a pair of high mettled, high stepping, good looking carriage horses, and never could anyone stay at a decent sized house without being taken through the stables to admire the stud. But what obtains now? Rarely when advising as to the purchase of horses am I asked, 'Are they good looking or good movers?' No, the terrifying motor has done its work, and the principal anxiety of a prospective purchaser now is as to whether they will stand all road nuisances.

"It is occasionally pointed out for our comfort that our fears of injury from motor traction are groundless, that the same fears were expressed when railways first came and gradually abolished the stage coach with its attendant horseflesh, and that now, as then, it will be found that instead of decreasing the demand for veterinary services, motors in some way or other will do as railways have done and actually increase it, and further, it is pointed out that never were carthorses so high priced or so difficult to find as they are to-day. I admit all this, but still say that we need to recognise that changes are occurring not to our pecuniary benefit.

"Let me go back thirty years and compare the condition of affairs. Then the tramcars and omnibuses were all horse drawn, and finding lucrative work for veterinary practitioners. Both these sources of income have almost disappeared, causing considerable loss to town practitioners. I was of the sufferers, but when this source of income went, I consoled myself with the reflection that omnibuses and trams never ought to have been horse work, and I was glad the poor hard worked horses were relieved of what was nothing but slavery. Next the pleasure motor appeared, and I do not think it too much to say that not one-third of the carriage horses exist to-day in this country that were here twenty years ago.

"Now the hired vehicles, cabs and hansoms are fast disappearing. Who thinks to-day of asking the hotel porter to whistle for a hansom? It is a taxi every time."

Current Literature

REPORT

Tanganyika: Annual Report of the Department of Veterinary Services, 1958.

Tanganyika's cattle, sheep and goats, virtually all of them owned by Africans, are numbered in millions and constitute one of the country's most valuable assets. The Veterinary Department is responsible not only for safeguarding the health of this stock—a task of considerable dimensions in itself—but also with trying to improve husbandry methods, increase productivity and promote trade.

In view of the immense size of the territory, much of it tsetse-infested and waterless, the general ignorance, conservatism and strongly entrenched communal customs of the African stock-owners, and the low plane of their husbandry systems it is a matter worthy of the highest praise that so much has been accomplished, particularly as the Department was seriously handicapped during the year by shortages of professional and lay staff.

Diseases. There is no major disease controlling machinery in the territory in the form of zoning into areas by fencing, nor are there any major quarantines as yet on the stock trade routes. However, a programme, financed largely from Colonial Development and Welfare Funds, is in hand to develop the stock routes by providing water supplies, transit camps and night stops on them.

Foot-and-mouth disease, trypanosomiasis, tick-borne diseases, blackquarter, rabies and helminthiasis are the chief diseases that trouble the territory. Others of less economic importance include anthrax, contagious postular dermatitis in sheep, contagious bovine pleuro-pneumonia, mange, malignant catarrh, mastitis, Newcastle disease, Rift Valley fever and sterility diseases.

For the fourth successive year no outbreaks of rinderpest occurred in cattle. Nevertheless, it continued to be a problem because of its prevalence in game animals, a fact which made it necessary to continue annual vaccination of cattle in the northern parts of the territory.

Foot-and-mouth disease was widespread. Types "A," "O" and "SAT2" were present. This disease, which hitherto had been regarded lightly, has lately assumed economic significance, and hence concern, because of the disruption it causes to trade, particularly the export of stock to neighbouring countries.

Trypanosomiasis was very troublesome in several Provinces, the situation being aggravated, in some cases by prolonged dry weather, or lack of grazing forcing owners to drive their cattle into tsetse-infested bush. Ethidium bromide and antrycide were the main agents for control and generally proved satisfactory.

Tick-borne diseases are very prevalent and the problem of dealing with them is one of considerable magnitude. East Coast fever is enzootic in many areas. Emphasis is naturally placed on attacking the exuberant tick life with dips and sprays. Regrettably, however, co-operation is not always readily forthcoming from African stock-owners. In the Iringa District of Southern Highlands Province, for example, an intensive compulsory dipping scheme had been in operation for 4 or 5 years and, by reason of the millions of immersions carried out in that time, had virtually eliminated *R. appendiculatus* and East Coast Fever. In 1958, following widespread opposition from the live-stock owners—the reasons for which are not apparent in the Report—the scheme had to be closed down.

Nevertheless, in contrast with this gloomy picture there was a growing interest in tick-control in several other areas and many thousands of immersions and sprayings were carried out.

Heart-water is suspected to have a wider incidence than the few confirmed cases suggest. Piroplasmosis was seen on several occasions and sporadic cases of anaplasmosis were reported from most Provinces.

Rabies was widespread and is well established in wild carnivora, which renders its eradication extremely difficult. Control measures in infected areas included movement restrictions, compulsory vaccination and stray dog destruction, but the results obtained varied largely in direct proportion to the extent of the public co-operation forthcoming. Some 27,000 dogs were destroyed and 9,500 vaccinated.

Blackquarter was known to be responsible for well over 2,000 cattle deaths; many more probably occurred, the animals being eaten. Anthrax is sporadic throughout the territory and in one Province there were several human deaths from the ingestion of infected meat. With both diseases there was an encouraging increase in the number of vaccinations given.

Animal Husbandry. Since most of the livestock feed in large herds on communal grazing grounds it is not easy for individual owners to practise much in the way of better husbandry systems. Nevertheless it is encouraging to note that there have been improvements in housing stock in a few areas, in using supplementary feeding-stuffs and mineral licks, and in producing animals for prophylactic inoculations against disease.

Much attention was given by the Department towards stimulating interest in better husbandry methods through its farms, demonstrations at veterinary centres, livestock shows, and the distribution of improved stock. Work was continued with Boran cattle, Black-headed Persian sheep and Rhode Island Red poultry. At the large Mkata Ranch the cattle holding was over 9,000 head.

The report, written by the Director of Veterinary Services, Mr. J. E. R. Roe, O.B.E., also contains full information on the activities of the Veterinary Research Division and the Livestock Research Division. A notable advance was the inauguration, during the year, of 3 Veterinary Investigation Centres, each to serve two Provinces.

W. E. L.

ABSTRACTS

Equine Sensory Ataxia (" Wobbles ") Clinical and Pathological Observations in Australian Cases. STEEL, J. D., WHITTEM, J. H., & HUTCHINS, D. R. (1959). *Aust. vet. J.* **35.** 442.

Investigations were carried out by the authors on 15 clinical cases of a disease in Australian horses apparently identical with that described in the U.S.A. as " Wobbles." The horses were of various breeds including Thoroughbreds, and a *post-mortem* examination was carried out on 11 of the cases seen. All the clinical histories had certain factors in common, the onset of symptoms occurring always in horses under 3 years old, frequently soon after weaning. In some, symptoms were sudden in appearance; but in most they were insidious, and frequently were precipitated by some traumatic episode such as casting.

The symptoms consistently observed were associated with paresis and sensory ataxia, showing dragging of the toes, stumbling and general errors in the rate, range, force and direction of movement of all 4 limbs, resulting in swaying and difficulty in balancing. The symptoms disappeared partially if the horses were excited, but became worse if the horses were blindfolded. In all cases, temperature, pulse, respiration, mucous membranes, appetite and blood analyses were normal.

Post-mortem examinations revealed marked lesions in the articular processes of some of the cervical and first few thoracic vertebrae, and occasionally there was stenosis of the spinal cord. Fracture of cervical vertebrae and injury to neck muscles were seen, but these were thought to be traumatic in origin. There was a focus of myelomalacia in the spinal cord of 1 horse. In the majority of cases the spinal cord was found to have lesions at various levels. These comprised swollen axis, cylinders, ballooning of myelin sheaths, vascularisation and cellular accumulations. The lesions were mainly in the dorsal columns and the white matter of the cords.

There were, in 8 cases, multiple focal sub-serous lesions of the intestines which were probably incidental, but which were unique in appearance and one of which contained a specimen of *Strongylus vulgaris*.

The aetiology of the condition is not considered to be hereditary nor traumatic in origin. It is postulated that the disease is due to a primary neurological disorder and that this could be responsible for abnormal posturing and consequent osteoarthropathy of the cervical articular processes. The neurological disorder is likely to be the cause rather than the result of the traumatic lesions which were found.

The origin of this neurological disturbance is, as yet, unknown, but it is possible that it may be related to the ingestion of a neurotoxin, an antivitamin or an antimetabolite during a critical growth period. It is considered unlikely that it is a simple dietary deficiency.

U. L.

The Influence of Dietary Calcium Phosphorus and Terephthalic Acid on Antibiotic Control of Experimental Infectious Synovitis. PRICE, K. E., & ZOLLI, Z. (1959). *Avian Diseases.* **3.** 135.

The authors found that the effect of treatment with Terramycin (at the 100 g. per ton level) was enhanced when the dietary calcium level was reduced to 0.18 per cent. The calcium lack resulted in a set-back in weight gains, but the authors considered that the likelihood of getting more birds to market might outweigh this disadvantage.

They suggested that the method may be applicable to other systemic diseases of poultry, but since its effect is on the blood serum level of the antibiotic rather than on the disease agent itself they doubted whether the method would be applicable when levels below 100 g. per ton were being used.

Cage Layer Fatigue (Cage Paralysis). GRUMBLES, L. C. (1959). *Avian Diseases.* **3.** 122.

The author describes cage layer fatigue or " battery cramp " as occurring more often in the summer months in young pullets that are laying well. The affected birds show symptoms of paralysis, but appear alert and continue to eat and drink. Most recover within 4 to 7 days if removed from the battery cage on to the floor or into an outside pen. Putting a cardboard floor into the battery cage may be equally effective. Autopsy of affected birds shows the long bones to be thin walled, brittle and very fragile. The cause of the condition is said to be obscure, and no specific preventive measures are recommended.

Survival of PPLO Injected into Eggs Previously Dipped in Antibiotic Solutions. CHALQUEST, R. R., & FABRICANT, J. (1959). *Avian Diseases.* **3.** 257.

These studies were made to investigate a possible method for the control of chronic respiratory disease in fowls and of sinusitis in turkeys.

It was found that antibiotics were absorbed through the shell into both the white and the yolk. Hatchability was not decreased. PPLO cultures injected into the yolk sacs of treated eggs tended to die out, erythromycin being more effective than oxytetracycline.

The authors regard this as a promising control measure, but emphasise the need for further experimental and field studies before it can be recommended for practical use.

Further Studies on the Experimental Transmission of Avian Osteopetrosis. HOLMES, J. R. (1959). *J. Comp. Path.* **69.** 385.

Osteopetrosis was transmitted by the inoculation of blood plasma that had been passed through a Seitz filter. This indicates that the infective agent is of small particle size—probably a virus.

The disease was also produced by oral administration of unfiltered plasma and by mating clinically affected birds.

E. A. G.

Parakeet and Canary Practice. LEONARD, R. H. (1960). *J. Amer. vet. med. Ass.* **136.** 378.

In a recent issue of the Journal of the American Veterinary Medical Association, R. H. Leonard, D.V.M., M.S., gave some "tips on parakeet and canary practice." Parallel with our experience in this country Leonard says, " birds in this country have increased so rapidly in the last few years that the number of parakeets alone is almost equal to the number of dogs and cats." He, too, underlines the necessity for the veterinary profession to take an active part in treating this type of patient. Perhaps equally important, he underlines that " fees should be commensurate with the time and skill involved, as in any other phase of practice."

The conditions noted by Leonard are as follows: loss of feathers, mites, fatty tumours, diarrhoea, paralysis, egg binding. He also discusses briefly surgery and some miscellaneous conditions.

Loss of feathers. Leonard suggests 0.5 mg. or repositol testosterone injected between the 2 layers of skin in the web of the wing, and claims the same treatment will aid in correcting voice changes and loss of voice when 2 injections given at 3-week intervals are usually all that is necessary. No one would dispute Leonard's contention that birds that are permanent feather pluckers do it 90 per cent. of the time from boredom, but many would dispute his contention that when the cage is moved outdoors during the day, the condition always responds.

In a paragraph headed " Surgery," Leonard gives as his dose for general anaesthesia 2 mg. pentobarbital sodium diluted with 0.25 c.c. water, given by mouth. He repeats this dose in 15 minutes if necessary. He claims the margin of safety is much greater orally than by injection. In view of the difficulty of administering oral medicines to parakeets, there are many who will dispute his contention most strongly. Considerable experience has now been gained with the intramuscular injection of suitable dilutions of pentobarbital sodium with completely satisfactory results and perfect anaesthesia. The technique is so simple that one wonders why Leonard goes to the trouble of oral dosage.

Under his heading " Fatty Tumours "—for some obscure reason not put under " Surgery "—Leonard claims that he prefers to operate without anaesthesia. He says, perhaps naïvely, " some shock occurs in the removal of large tumours when no anaesthesia is used." He claims this type of shock is more successfully controlled than that experienced using general anaesthesia. This is a moot point! Large tumours—now described under the heading " Surgery "— are apparently ligated around their base, increasing the tension of the ligature from week to week in order to cut off the blood supply to the tumour. Leonard claims that the tumour will drop off; what is strange, however, is that when describing fatty tumours he says that, " most birds will succeed in picking them (sutures) loose before healing occurs." One is at a loss to understand how the bird differentiates between a surgical suture and a strangulation suture applied to the base of a fatty tumour.

Under the heading " Paralysis," Leonard states with obvious truth that birds that fall off the perch, lie on their side, or have to hold with the beak as well as the feet to keep their balance, are often paralysis victims. No one would dispute this, but to state that all paralyses of parakeets and canaries can be cured by the administration of 3 or 4 drops of mineral syrup a day is a little optimistic.

Leonard deals with egg-binding by raising the temperature in which the bird is living up to 110° to 120° F. for 20 minutes at a time stating that the veterinary surgeon should keep " a close watch so that prostration will not occur." Most people recommend a temperature of 85° F. perhaps for longer than the 20 minutes recommended by Leonard, and one is curious to know why the excessively high temperatures mentioned by him are necessary. He describes lubrication of the cloaca with mineral oil to assist passing of the egg, but fails to mention any technique involving hypodermic puncture of the undelivered egg and withdrawal of its contents, nor does he warn that there is only one functional oviduct of the bird which lies on the left hand side. He admits that sometimes a yolk is free in the abdominal cavity, and produces peritonitis. His treatment for this is to " aspirate " but he does not describe what he is aspirating nor the site of his injection. He then injects 1 or 2 c.c. of 5 per cent. sulphamerazine intraperitoneally through the same needle and repeats the procedure in 3 to 4 days. American parakeets must be hardy!

Under the heading " Miscellaneous," Leonard makes one or two alarming remarks. He says, " for treating colds and pneumonia, I have found whisky better than antibiotics." He dilutes the whisky with 10 parts of water, puts it on bread and gives it to the bird every 2 hours. This presupposes that the bird is sufficiently well to eat, and if it is, that it likes bread. In contrast to his statement about whisky, he goes on to say that, of all the antibiotics, oxytetracycline gives the best results. This is administered as a liquid on bread, or as a powder mixed with fresh orange, hamburger, or cheese. One is astonished at the catholic appetite of pneumonic parakeets.

The article is commended in the sense that Leonard is, at least, underlining the fact that parakeets and canaries can be treated by veterinary surgeons, and he emphasises the moral that they should be treated by veterinary surgeons. In this country to-day, many owners of exotic pets are being driven to free clinics and the like because qualified veterinary surgeons are disinclined to give them help for their pets. But since Dr. Leonard presented his paper before the Section on Small Animals at the 96th Annual A.V.M.A. Convention in Kansas City in August, 1959, the abstractor felt justified in taking exception to the very loose way in which the subject was presented and discussed.

The threshold between life and death in these very small creatures is frequently so very slender that inaccuracies and guess work with regard to diagnosis and treatment are not admissible.

O. G. J.

News and Comment

BESTOWAL OF R.C.V.S. HONORARY ASSOCIATESHIP ON PROFESSOR MANNINGER

A very pleasant ceremony took place at the Royal College last Monday, when the Diploma of Honorary Associate was bestowed by the President on Professor Dr. Rudolph-Reszo Manninger in the presence of the Hungarian Minister and a distinguished company of veterinary surgeons and guests, including Mme. Manninger.

Having welcomed the visitors Mr. Ritchie made the presentation in the following terms:—

"The Royal College of Veterinary Surgeons delights in its right to honour outstanding members of the veterinary profession wherever they may be working throughout the world. From time to time, but never without great care and consideration, it selects one or more names to be added to the list of distinguished men who have been chosen to receive the highest honour in the power of the College to bestow—election as an Honorary Associate of the College. To-day we have met for one purpose only, to welcome Professor Manninger as our latest Honorary Associate. In doing so we add further distinction to an already distinguished roll of names.

"He is so well known that it is almost an insult to the audience to do more than outline the main achievements of a man who has spent a long and fruitful lifetime in service to mankind by his contributions to the understanding and control of animal disease. Professor Manninger, I believe, started his studies with the intention of becoming a biochemist. From there he developed an interest in serology and from that fascinating subject it is but a broadening of outlook and application to proceed to become an epidemiologist. What biochemistry lost, was gained for that wide subject of epidemiology—a subject to which lip service is given by so many but which is understood and applied by so comparatively few.

"If he had done nothing but produce the various publications with which his name is associated we would be deeply in his debt. His writings, however, could not have been produced and would have been sterile and uninspired without his arduous training and experience in the widest field of veterinary activity and his close studies and critical appraisal of scientific literature. His work has covered many diseases, outstanding among which are swine fever and enterotoxaemia.

"We welcome a man to-day who stands at the highest peak of his profession, held in great esteem in his own country and in international veterinary circles alike."

Having paid a tribute to, and welcomed, Mme. Manninger, the President concluded:—

"Rudolph Manninger, I have the greatest possible pleasure in handing to you on behalf of the Royal College of Veterinary Surgeons this tangible evidence of the addition of your name to our list of distinguished men. In doing so may I offer you my own good wishes, the congratulations of the Royal College of Veterinary Surgeons and a hearty welcome to its honorary associateship."

In accepting the award Professor Manninger referred to the delight with which he had first learned of the Royal College's decision to honour him, and his deep sense of the privilege of joining that famous roll of names which constituted the Honorary Associates. He was deeply touched on this occasion, and he thanked the President of the Royal College most sincerely.

After the ceremony guests were entertained to tea, and then inspected a number of exhibits from the College archives, including rare manuscripts and books.

THOSE WERE THE DAYS

We are indebted to Mr. W. Douglas Williams for sending us, by courtesy of its Editor, a copy of the centenary souvenir number of *The Newtown and Montgomery Express*, on the front page of which, prominently displayed, appears the following advertisement by a past member of the profession. Those, clearly, were the days before the niceties of etiquette obliged veterinary surgeons to hide their lights under bushels!

JAMES SKITT
VETERINARY SURGEON
Shrewsbury

Begs to submit to Farmers and others the following List of Medicines for Horses and Cattle.

	s.	d.	
Fever Drenches	1	6	each
Cleansing ditto	1	4	„
Comforting ditto	1	0	„
Drying ditto	1	0	„
Black Water ditto	1	6	„
Liniment for Garget or Inflammation in Cows' Bags or Udders	1	6	„
Horse Balls	0	6	„
Dieuretic Balls	0	4	„
Specific for Flatulency, Colic, or Gripes	2	6	„
Black Embrocation	2	0	„
White Oils for Swellings, &c.	2	0	„
Embrocation for Lameness in Neat Cattle	2	0	„
Balsam for the Hoove in Calves (½-pint bottle)	1	6	„
Ditto ditto (pint bottle)	2	6	„
Chronic Cough Mixtures	2	0	„

Printed Directions as to quantities and use are given with each of the above.

The above Horse and Cattle Medicines may be had from the proprietor, J. Skitt, Veterinary Surgeon, Salop; and also from Miss Skitt, Milliner, &c., Short-bridge House, Newtown.

These Drenches are the best ever used for all kinds of Fevers in Neat Cattle. No Farmer should be without them, they will keep for years; they were first known by the late Mr. G. Shingler, Veterinary Surgeon, in 1804. J. Skitt, Veterinary Surgeon, only has the recipe, and has made more cures with them in this country than have been effected by any other remedy used by other Veterinary Surgeons.

DR. DANIEL OWEN MORGAN

Daniel Owen Morgan, University Lecturer in Animal Pathology at Cambridge and former Senior Lecturer in Zoology at the University of Edinburgh, died in Cambridge, after an illness, on November 17th, 1959. He will be remembered by many of his former pupils and by a wide circle of friends and colleagues as an able teacher and research worker who was always approachable and willing to help the student with his difficulties. There can be few men who, although not qualified as veterinarians, so closely identified themselves with the profession and who understood and were willing to help with the solution of its problems. Shortly after his death a small number of his friends thought that the profession and his former pupils might wish to commemorate him, his work for numerous undergraduates, and for agriculture in general. Various schemes were considered, but in view of his interest in teaching and in his College in Cambridge it was decided to try to endow with any monies collected an open named scholarship at St. Catherine's College, Cambridge, for undergraduates who intended to read for veterinary medicine. The Master and Fellows of the College have now formally agreed to establish such a scholarship if the funds are available. During the past few months the sponsors of this appeal have approached several commercial houses and have met with a most generous response. They now appeal to friends and former students of D. O. Morgan to ask for their support to collect the sum of about £400 which is still required to provide sufficient endowment to support this scholarship. It is hoped that such a scholarship, with its openings for undergraduates who read veterinary medicine, will be thought to be a fitting tribute to his memory.

Donations for the fund should be sent to Dr. E. J. L. Soulsby, School of Veterinary Medicine, Madingley Road, Cambridge. It would be a convenience if the envelopes were marked "D. O. Morgan Memorial Fund."

THE REGISTER OF VETERINARY SURGEONS

The undermentioned were admitted to the Commonwealth List of the Register of Veterinary Surgeons on the dates indicated:—

Borland, Narelle Anne (Mrs.), B.V.SC. (SYDNEY), c/o Overseas Visitors Club, 180, Earls Court Road, London, S.W.5, May 11th, 1960; Borland, Robert, B.V.SC. (SYDNEY), c/o Overseas Visitors Club, 180, Earls Court Road, London, S.W.5, May 11th, 1960; Purchase, Iain Francis Harvey, B.V.SC. (PRETORIA), c/o Standard Bank of South Africa, 9, Northumberland Avenue, London, W.C.2, May 10th, 1960.

Erratum

It is regretted that our reporter mis-heard a name in the R.C.V.S. Obituary List to which reference was made, at the meeting of the College Council, by Professor Boddie. In place of Major William Barr, as published last week, the name should have been that of Major Hubert Gillmor.

PERSONAL

Births

ASHDOWN.—On May 9th, 1960, at St. Brenda's Maternity Hospital, Clifton, Bristol, to Margaret and Raymond Ashdown, a son, Stephen Francis.

WILKINS.—On May 13th, 1960, at The Balidon, Yeovil, to Margaret (*née* Hyatt) and Geoff Wilkins, MS.R.C.V.S., a daughter, Alison Catherine, a sister for Roger.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

JUKES, Anthony William, Veterinary Education Officer, Veterinary Department, Kano, N. Nigeria. Graduated December 7th, 1944, at the Royal Veterinary College, London. Died May 8th, 1960, aged 41 years.

MAJOR JOHN ADAMSON

Mr. E. R. Callender writes:—

Major Adamson, whose death occurred last week, was well known to many of the older members of the profession. He was born in 1877 at Bolton where his father, Mr. David Adamson, a native of Brechin, had been in practice as a veterinary surgeon for some years.

Major Adamson qualified at the Royal Veterinary College, London, in 1901 and after a short period as House Surgeon at the Royal (Dick) Veterinary College he joined Mr. Pierce at Paddington, London, as an assistant and remained there for about a year. He returned to Bolton and entered into partnership with his father in what was then a very extensive equine practice. In 1909 he became a veterinary inspector to the Lancashire County Council and on the inauguration of the State Veterinary Service in 1938 a Local Veterinary Inspector to the Ministry of Agriculture and Fisheries. He was appointed veterinary lieutenant to the 9th Lancashire Royal Garrison Artillery in 1905, and in 1909 he was gazetted as lieutenant in the new Territorial force.

During the 1914-18 war he served overseas in France and Palestine, at first with the 42nd Division and later was appointed A.D.V.S. to the 52nd Lowland Division. He was awarded the Military Cross for distinguished service in the field in connexion with the military operations which culminated in the capture of Jerusalem.

At the end of hostilities he returned to Bolton and he ultimately retired from practice in 1948, thus ending a long and honourable career, extending over some 47 years. Mr. John Adamson, Junr., his nephew, succeeded him.

Major Adamson was for many years a well-known figure in Bolton, where he was extremely popular; amongst his many activities he was honorary veterinary surgeon to the Holcombe Hunt, the Bolton Canine Society and the Bolton Fox-terrier Club. In his later years he became a keen angler and he also had a considerable reputation as a grower of carnations.

The funeral service was held at the Overdale Crematorium, Bolton, on May 9th, when a large number

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of his friends attended to pay their last respects to one who was held in the highest esteem in his native town. Members of the profession who attended were Mr. John Adamson, Junr., Mr. H. Holroyd and Mr. E. R. Callender.

COMING EVENTS

May

21st (Sat.). Annual Reunion and Dinner Dance of the Chiron Club at the Grand Atlantic Hotel, Weston-super-Mare, 7 p.m.

22nd (Sun.). R.V.C. Annual Motor Rally to Beachy Head.

25th (Wed.). R.C.V.S. Day.

117th Annual General Meeting of the Royal College of Veterinary Surgeons at 10, Red Lion Square, London, W.C.1, 3.45 p.m.

Annual General Meeting of the West of Scotland Division at the Veterinary Hospital, Garscube Estate, Bearsden, 2.15 p.m.

Annual General Meeting of the Sussex Veterinary Society at the Old Ship Hotel, Brighton, 2.30 p.m.

Annual General Meeting of the Society of Women Veterinary Surgeons at Imperial Chemical House, Millbank, London, S.W.1, 2.15 p.m.

Annual General Meeting of the Victoria Veterinary Benevolent Fund at 10, Red Lion Square, London, W.C.1, 4.15 p.m. (or immediately following the Annual General Meeting of the R.C.V.S.).

26th (Thurs.). Meeting of the Western Counties Veterinary Association at the Hotel Victoria, Newquay, 2.30 p.m.

27th (Fri.). Dance of the Herts. and Beds. Veterinary Association Ladies' Guild at the Dujon, Bedford, 8.30 p.m.

Ordinary General Meeting of the Royal Counties Veterinary Association at the Caversham Bridge Hotel, Reading, 2.30 p.m.

Annual General Meeting of the Essex Veterinary Society in the Conference Room of the Ministry of Agriculture, Beeches Road, Chelmsford, 7.30 p.m.

28th (Sat.). Annual General Meeting of the B.S.A.V.A. Southern Region at the Royal Hotel, Winchester, 7.30 p.m.

30th (Mon.). Meeting of the East Yorkshire Clinical Club at the Talbot Hotel, Malton

June

1st (Wed.). Meeting of the B.S.A.V.A. North Eastern Region at the Hotel Metropole, King Street, Leeds, 8 p.m.

3rd (Fri.). 168th Annual Ball of the R.V.C. Students' Union Society at the Park Lane Hotel, Piccadilly, W.1, 8 p.m.

8th (Wed.). A General Meeting of the South Wales Division at the Caswell Bay Hotel, Mumbles, Swansea, 2.15 p.m.

10th (Fri.). Annual Dinner of the R.A.V.C. Officer's Club at the Naval and Military Club, 94, Piccadilly, London, W.1.

11th (Sat.). Annual Reunion Dinner of the R.V.C. 1952 Club at Ye Miller of Mansfield, Goring, 7 p.m.

25th (Sat.). Meeting of the North West Region of the B.S.A.V.A. at the Conservative Club, Market Street, Wigan, 7.30 p.m.

July

6th (Wed.). Meeting of the Technical Development Committee of the B.V.A., at 7, Mansfield Street, 10.30 a.m.

20th, 21st and 22nd (Wed., Thurs. and Fri.). B.V.A. Committee and Council Meetings in London.

August 28th to September 3rd. 78th Annual Congress of the British Veterinary Association in Glasgow.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Ayr. Ravenscroft Farm, Rankinston (May 16).

Kirkcudbright. Carlingwark Park, Castle Douglas (May 10).

Somerset. Mead House Farm, Pedwell, Bridgwater (May 12).

Warwicks. Oak Farm, Walmley Ash Road, Walmley, Sutton Coldfield (May 9).

Fowl Pest

Beds. Chenies, Tring Road, Eaton Bray, Dunstable (May 10); Herne Poplars Farm, Toddington, Dunstable (May 14).

Berks. Earlstone Manor Farm, Old Burghclere, Newbury (May 13); Highfield, Clappers Road, Silchester, Reading (May 14).

Essex. Wheelers Farm, Sheering, Bishops Stortford (May 10); Great Lodge Farm, Castle Hedingham, Halstead (May 11); Ellises Farm, Gestingthorpe, Halstead (May 13); Millers Farm, Debden, Saffron Walden (May 6).

Hants. Suddern Farm, Over Wallop, Stockbridge (May 10); 1, Ragmore Farm, Cottages, Heckfield, Basingstoke; Franora, Crescent Road, Locksheath, Southampton (May 14); Causeway Farm, Hartley Witney, Basingstoke (May 15).

Herefords. Little Priddleton, Steens Bridge, Leominster (May 9).

Herts. Gustard Wood, Wheathampstead, St. Albans (May 9); Lines Farm, Welwyn (May 12); Beech Hyde Farm, Wheathampstead, St. Albans (May 13); Ayot House, Ayot St. Lawrence, Welwyn (May 15).

Leics. Thornton Lane, Markfield (May 9); Upper Grange Farm, Markfield (May 12).

Lincs. Partney House, Partney, Bilsby, Alford; Bridge Farm, Skegness Road, Burgh-le-Marsh, Skegness (May 9); 21 Swan Street, Lincoln (Apr. 11); Ballacrain Poultry Farm, Skegness Road, Burgh-le-Marsh, Skegness (May 12); Swan Farm, Collyweston, Stamford; West Farm, Collyweston; Stamford; 6, Ponds Yard, Collyweston, Stamford (May 16).

Norfolk. The Street, Bintree, Dereham (May 9); Freethorpe, Norwich; Post Office, Freethorpe, Norwich (May 13).

Notts. The Ranch Poultry Farm, Burton Road, Gedling; Normanton Hall, Normanton, Southwell; Boughton Allotments, Boughton, New Ollerton, Newark (May 10); Temple Croft, Edingley, Newark (May 11); Great Farm, Kirkling-

ton, Newark; Ollerton Station Site, Ollerton, Newark (May 12); Edingley Hill, Edingley, Newark; Church Farm, Rolleston, Newark (May 16).

Oxford. 4, Council Cottages, Bletchington (May 9); The Slade Farm, Kirtlington, Bletchington (May 11); Hill View, Bletchington (May 13).

Pembs. The Poultry Farm, Withybush Aerodrome, Withybush, Haverfordwest (May 10).

Staffs. 101, High Street, Cradley Heath (May 14).

Surrey. Lady Grove Farm, Selsdon Park Road, Selsdon, South Croydon (May 12); 14, Yew Tree Way, Addington, Selsdon, South Croydon (May 16).

Sussex. Cherry Gardens, Downlands Lane, Copthorne, Crawley (May 12); Holly Hill Nurseries, Vines Cross, Horam (May 13); Dodlea, Downlands Lane, Copthorne, Crawley (May 14).

Warwicks. 74, Brookfield Road, Langley, Oldbury, Birmingham (May 14).

Wilts. Manor Farm, Chitterne, Warminster (May 13).

Worcs. The Holding, Wildmore Lane, Bromsgrove (May 9); Forge Lane, Belbroughton, Stourbridge (May 12); The Smallholding, Wildmoor Lane, Bromsgrove (May 13); The Allotments, Marpool Lane, Kidderminster (May 14).

Yorks. Lower Lathe Farm, Providence Lane, Oakworth, Keighley (May 11).

Swine Fever

Cambs. Cuckoo Pasture Farm, Boxworth (May 13).

Ches. Bulkeley Hall, Bulkeley, Malpas (May 11).

Denbigh. The Darlands, Overton, Wrexham (May 16).

Devon. Bradley Farm, Buckland Filleigh, Holsworthy (May 12).

Dorset. Gloucester Dairy, Charlestown, Weymouth (May 9); Innsacre Farm, Shipton Gorge, Bridport (May 10); Higher Dairy, Cowgrove, Pamphill, Wimborne (May 13).

Hants. Brook Farm, Brook, Newport, Isle of Wight (May 9); Dinglers Farm, Galbourne, Newport, Isle of Wight (May 12).

Herts. Springhill Farm, Springwell Lane, Rickmansworth (May 9).

Kent. Springfield, Ansdore, Waltham, Canterbury (May 9); Whitehall Farm, Capel-le-Ferne, Folkestone (May 13).

Lancs. Balls Farm, Brook Lane, Little Hoole, Preston (May 10); 100, New Lane, Winton, Eccles, Manchester; Stake House Farm, Bleasdale, Garstang, Preston (May 16).

Leics. Church Farm, Humberstone, Leicester (May 10).

Lincs. Chanleys Piggeries, Macauley Lane, Grimsby (May 9).

Norfolk. New Buildings Farm, Cromer Road, North Walsham; The Nurseries, Morton-on-the-Hill, Norwich (May 9); Hall Farm, Shimpling, Burston, Diss (May 11).

Salop. Peaton Piggeries, Craven Arms (May 13); Alkington Hall, Alkington, Whitchurch (May 16).

Somerset. Highfield Park Farm, Highfield, Wick, Bristol (May 10); Claverham House, Claverham, Bristol (May 16).

Staffs. Peel House Farm, Audley, Stoke-on-Trent (May 12).

Suffolk. Glebe Farm, Ilketshall, St. Andrews, Beccles (May 9).

Surrey. 41, Eastwick Drive, Great Bookham, Leatherhead (May 9); Woodside Farm, Bittams Lane, Ottershaw, Chertsey (May 16).

Yorks. Rockley Old Hall Farm, Worsbrough Bridge, Barnsley (May 9); Barkisland Hall Farm, Barkisland, Halifax (May 10).

NEW MINISTRY APPOINTMENTS

The Prime Minister, with the agreement of the Ministers concerned, has approved the following appointments:—

Mr. H. Hardman, C.B., at present a Deputy Secretary in the Ministry of Agriculture, to be a Deputy Secretary in the Ministry of Aviation, in succession to Mr. B. D. Fraser, C.B. Mr. P. Humphreys-Davies, C.B., formerly a Deputy Secretary in the Ministry of Supply, to be a Deputy Secretary in the Ministry of Agriculture, in succession to Mr. Hardman.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

GENERAL

Lymphatic Leukosis

Sir,—Since tantalisingly brief reference has now been made twice in print to my case of lymphatic leukaemia in which dramatic changes followed lymph node removal, I append further details of the case for the information of those who may be wondering what it was all about.

Although the case occurred many years ago I can still recall it most distinctly. The patient was a black Cocker Spaniel bitch about 8 years old showing the typical signs of the lymphatic leukosis complex with marked enlargement of all palpable lymph nodes. At the time Professor Haddow was trying out various compounds in the treatment of this disease and kindly made one of these (I think I am correct in saying it was a nitrogen mustard) available to me, asking that in return he might receive a blood sample and a lymph node for biopsy. A popliteal lymph node was duly removed under local anaesthesia and the same day the dog was started on the compound supplied by Professor Haddow. Within 48 hours all superficial lymph nodes had regressed to their normal size and there was, in addition, complete remission of all associated symptoms. The dog became bright, full of energy, and regained appetite and other normal habits.

At first we hopefully ascribed this to the new drug, but after some 3 to 4 weeks despite continued medication the lymph nodes gradually enlarged, symptoms returned, and by the sixth week after biopsy the dog had reverted to its original state of ill health. Since the only other factor which could have caused this remission was the removal of the node it was decided to repeat the process and the second popliteal node was accordingly removed; exactly the same dramatic remission ensued with the same time pattern. Subsequently both superficial inguinal nodes were removed at 6-week intervals, and finally an axillary node. Each time regression of signs and symptoms occurred, but following removal of the axillary node signs of secondary bacterial infection occurred and the owner requested euthanasia.

I have never had, nor heard of, a repetition of the dramatic changes which occurred in this case as a result of lymph node removal. I did have one similar result, also in a Cocker Spaniel, following removal of the grossly enlarged spleen. Again remission lasted about 6 weeks and on the return of symptoms the owner requested euthanasia. I have carried out splenectomy in other similar cases with little or no effect.

Following a line of thought similar to that outlined by Mr. Owen and consequent upon the report by Clover of his use of cortisone in a case of lymphatic leukosis, I have been prescribing steroid therapy in these cases. Of cases so treated about two-thirds have benefited from this treatment in so far as symptomatic improvement is concerned. The dogs became much brighter, regained appetite and energy, put on weight and in cases where there was slight fever unassociated with obvious secondary infection temperatures became normal. There was little if any effect on size of lymph nodes or spleen. The expectation of life of these animals was increased, not because of any effect on the underlying pathological process but because suppression of symptoms and the increased well-being of the patient delayed the time at which euthanasia became desirable. In fact, in undertaking steroid therapy in leukaemia cases it is in my view essential that it should be made abundantly clear to the owner that this treatment does not affect the fundamental disease process and that the pathological changes are progressing inexorably under the masking effect of cortisone, and that sudden collapse and even death may occur without warning. This has happened in 2 of my cases at least. I have found, however, that most owners have been very willing to accept this amelioration of symptoms during the animal's remaining weeks of life despite the fact that one's prognosis must invariably be the same. Unfortunately owners are not so ready in these circumstances to permit taking of blood samples and biopsy material from the patients as one cannot possibly tell them that these procedures will benefit the animal, hence I have no reports of the effects of therapy on blood or lymph node histology to offer.

The lymphatic leukosis complex remains a baffling problem for clinician and pathologist and, as Mr. Owen has rightly stressed, at the present time prognosis must remain extremely poor.

Yours faithfully,
JOAN O. JOSHUA.

78, Brentway,
Finchley, N.3.
May 17th, 1960.

Fracture of the Bovine Skull

Sir,—Regarding your readers' letters on the ease with which the bovine skull is fractured I should like to record a most unusual injury in a 1½-year-old Shorthorn heifer.

This animal sustained the injury after being struck head on by a cow.

On examination the median palatine fissure was split so wide open that a finger could be inserted through it into the nasal passages. The heifer was unable to eat and in great pain, so it was decided to slaughter it immediately as repair would probably never have taken place.

Yours faithfully,
D. SEAWRIGHT.

43, Moss Street,
Keith,
Banffshire.
May 10th, 1960.

Displacement of the Abomasum in a Bullock

Sir,—The following case may be of interest because of the type of animal involved. A two-and-a-half-year-old bullock had been reared from calfhood by the owner without any trouble, and had eventually come to be run with other bullocks in a yard. Unfortunately, like many animals kept under these conditions, little attention other than routine was given to them, until about the time they were due to be sent for slaughter. It was then noticed that one bullock appeared slightly poorer in condition than the others, and showed little inclination to eat.

This was confirmed at the first examination though the general bodily condition was sufficiently good to suggest that the illness was of only recent origin. Further examination on this occasion did not reveal anything conclusive though a "tinkle" was thought to be heard over the posterior costal region on the left side. No specific diagnosis was made, treatment consisted of 150 ml. sulphadimidine and 4 ml. "Hepmin." Re-examination, 3 days later, revealed marked distension over and behind the left costal arch, which on percussion gave a markedly resonant sound. On auscultation the typical high-pitched fluid or metallic sounds of a displaced abomasum were to be heard. No improvement had been noticed.

It was decided to send the animal for slaughter. *Post-mortem* examination revealed nothing except that the liver was smaller than is usual.

I have also experienced a similar case in a stirk which had recently been moved with others by lorry, which makes me wonder whether some excessive movement or a sudden blow might be the precipitating cause in such cases where physiological re-arrangement of abdominal contents as may occur in pre- or post-parturient animals cannot be blamed.

Yours faithfully,
NORMAN S. M. MACLEOD.

33, College Road,
Framlingham,
Woodbridge,
Suffolk.
May 16th, 1960.

"An Anaesthetic Mishap"

Sir,—We were interested to read Miss Joshua's letter in your issue of May 7th. A partial answer to the last paragraph of her letter may be found in an article (Walker & Rex, 1958) in which we recorded 2 cases of cardiac arrest treated by direct cardiac massage. In the first case delay in restoring normal heart action resulted in decerebrate rigidity due to

cerebral anoxia, but in the second case recovery was complete in spite of a period of 24 hours, when the animal was obviously blind.

Transient or permanent blindness following cardiac arrest is recorded in both medical and veterinary literature. Hoerlein (1955) recorded permanent blindness in a Pekingese which developed cardiac arrest following intravertebral disc surgery, and Blair, Irvine and Taylor (1958) record transient blindness in a man who developed cardiac arrest following intravenous neostigmine. His vision steadily improved over a period of 3 months, but remained impaired at the time of the report.

The fact that blindness is one of the commonest complications to cerebral anoxia, and that given time, in many cases it appears clinically reversible, should be a stimulus to delay euthanasia as long as possible in such cases. It is often difficult to be absolutely certain of the precise moment that cardiac arrest occurs, and consequently one has little time to consider the justification of one's actions before instituting resuscitative measures.

We hope that Miss Joshua will not abandon hope in the future should she be faced with a similar emergency, purely on the disappointment of one failure.

Yours faithfully,
R. G. WALKER.

School of Veterinary Medicine,
Cambridge.

M. A. E. REX.

Blue Cross Animal Hospital,
Grimsby.
May 10th, 1960.

References

BLAIR, D. W., IRVINE, W. T., TAYLOR, R. C. (1958). *Brit. Med. J.* 1,521.
HOERLEIN, B. F. (1955). *J.A.V.M.A.* **127.** 210.
WALKER, R. G., & REX, M. A. E. (1958). *Vet. Rec.* **70.** 667.

Laparo-cystotomy for Urinary Calculus in a Gelding

Sir,—Since our publication of the case record of the successful performance of the above operation (*Vet. Rec.* **72.** 301) our attention has been drawn to a previous publication by Professor H. F. Wirstad of Vienna (*Wiener Tierärztliche Monatsschrift.* **46.** 442), in which he records successful suprapubic cystotomy for calculus in both a stallion and a gelding. We would wish to make acknowledgment to him.

Yours faithfully
J. G. WRIGHT,
P. A. NEAL.

University of Liverpool,
Faculty of Veterinary Science.
May 16th, 1960.

Warfarin Poisoning at Derby Stadium

Sir,—With reference to Professor Helge Stormorken's letter in your issue of May 14th, 1960, we must point out that our publication (*Vet. Rec.* **72.** 102) was a factual statement of events which happened at Derby Stadium, and not a research paper on the physiological and pathological effects of warfarin poison on the various components of blood. For example, the Quick-1-stage time (prothrombin time) was normal in the 24 dogs tested. They had had vitamin K.1.

The management of the track had stopped racing for one month, and as they wished to start again we were asked to examine a representative selection of Greyhounds and to express an opinion as to whether it would be safe to allow them to race; included in our examination we tested for prothrombin time.

Whilst nobody seems to have disputed our facts, there would appear to be a divergence of opinion on interpretation. It must be appreciated that our diagnosis was not made from the episodes at Derby Stadium alone, but from similar clinical and *post-mortem* findings on other dogs, including gun dogs and Greyhounds.

Yours faithfully,
S. F. J. HODGMAN,
R. S. T. BOWDEN.

The Animal Health Trust,
Canine Health Centre,
Kennett,
Nr. Newmarket,
Suffolk.
May 16th, 1960.

The Things Our Clients Say

Sir,—As a member of an Agricultural Advisory Service I was interested in the letter from Mr. Trought (THE VETERINARY RECORD, May 7th).

We also have our share of the amusing, unusual, or merely bizarre. For instance, there was the correspondent who claimed that a Welsh terrier persists in carrying the family's pet tortoises all over the garden and in the house, frequently leaving them somewhere *upside down*—and what could we do about it?

Suggestions from the advisory staff ranged from "give the dog a hiding" to "hide the tortoises." The more practically minded amongst us suggested supplying a few labels in red lettering marked "this side up" (or because it was a foreign dog "Ochor yma I fynu"). If all else failed, it was considered feasible to tie a hedgehog to the back of each unfortunate chelonian.

Then, of course, there was the time we were asked about the two circus elephants—but perhaps you, Sir, may consider that too "smoke room" for THE VETERINARY RECORD.

Yours faithfully,
N. M. BLACK.

Nottingham.
May 16th, 1960.

SCIENTIFIC

An Attempt to Separate the Scrapie Agent from Brain Tissue

Sir,—In view of current interest in the chemical nature of the agent which is responsible for the transmission of scrapie by inoculation, we felt it was desirable to communicate the details of a pilot

experiment which we carried out in 1955-6 to explore possible methods of isolating the agent from brain tissue prior to identification by chemical and physical analysis and electron microscopy. This experiment has provided a background for the development of subsequent work in this direction at Moredun Institute and demonstrates further the unusual resistance of the agent to inactivation by chemical and physical treatment. So far as we know no experiment of this kind has been reported hitherto.

Material

Brains from 12 Cheviot sheep which had been "infected" with scrapie experimentally were homogenised and mixed without dilution in an M.S.E. Atomix at 13,000 r.p.m. for 2 minutes, to form Scrapie Sheep Brain Pool, Strain 1, Passage 19. They had been stored at −40° C. for periods varying from 1 to 5 months and the homogenate was returned to storage at this temperature immediately after preparation. All glassware used in this and the subsequent stages was sterilised in an autoclave before use.

Preliminary Treatment

Ninety-six g. of the deep-frozen, homogenised brain tissue were freeze-dried in an Edwards 3 PS Freeze Dryer for 48 hours at a maximum temperature of 37° C. The product, which constituted approximately 16 per cent. of the homogenate, was powdered with a glass pestle and 15.6 g. were transferred to a 28 × 80 mm. Whatman, single thickness, fat-free extraction thimble which had been previously purified by extraction with Analar grade ether.

Fractionation Procedure

Ether Extraction. Lipids were removed completely by extraction with 3 250-ml. portions of Analar grade diethyl ether at a temperature of 32° to 36° C. in a Soxhlet apparatus for 2 periods of 5 hours followed by one of 1 hour. Dry matter estimations on the second and third extracts showed that extraction was complete after the second stage. The extracts were combined and evaporated to dryness under reduced pressure. The residue weighing 6.2 g. was stored in the distillation flask at −40° C. until required for inoculation into sheep as Fraction I.

The material in the extraction thimble was allowed to remain in the apparatus overnight between the first and second extractions. After the final extraction the ether was removed from it under reduced pressure. 1.2 g. were then removed and stored at −40° C. for inoculation as Fraction II.

Water Extraction. The remainder of the material in the extraction thimble was subjected to extraction with water at 94° to 98° C. in an asbestos-jacketed Soxhlet apparatus. Extraction was carried out with 75 and 100 ml. portions of double, glass distilled water over a period of 4 days, the time of each extraction varying from ½ hour for the first 13 extractions to 6 hours for the final one. Water soluble material was still present at this stage and since it was probable that a considerable proportion of it was being produced by hydrolysis it was decided to terminate the extraction. The extracts, which had been kept in the cold store at about 4° C. while the extraction was continuing, were combined to give a total volume of 1,450 ml. and were then freeze-dried and stored at −40° C. for inoculation as Fraction III.

The residue in the extraction thimble which had been kept in the cold store for overnight periods during the extraction was stored at −40° C. for inoculation as Fraction IV.

Infectivity Tests

Each fraction was suspended in 20 ml. of sterile 0.85 per cent. (w/v) sodium chloride. Fifteen sheep (South Country Cheviots, approximately 8 months old) were each inoculated intracerebrally with 1 ml. of the appropriate suspension. The activity of the original brain homogenate was tested concurrently by inoculating a group of 30 sheep, of the same breed and age, intracerebrally with 1-ml. doses of a 10 per cent. suspension of the homogenate in 0.85 per cent. saline.

Clinical signs of scrapie appeared in a proportion of the sheep in each group from 4 to 8 months after inoculation as shown in the following Table:—

Fraction	Dry matter in inoculum, mg.	Equivalent weight of dry brain, mg.	Number of cases/ number inoculated
Whole brain ...	16	16	10/30
I—Ether extract ...	310	775	3/15
II—Residue from ether extraction ...	60	100	5/15
III—Water extract ...	100	685	3/15
IV—Residue from water extraction ...	310	685	4/15

Unfortunately it was not possible to titrate the activity of each fraction owing to the low transmission rate in sheep and the differences between the figures for the incidence of scrapie in the various groups have no statistical significance. Consequently no information could be obtained to indicate whether the high effective concentrations achieved in Fractions I, III and IV had raised the activity. It is not known whether the activity of the ether and water extracts was due to the extraction of a substance in true solution or to the contamination of the extract with infective particles which had passed through the Soxhlet thimble. However, it is clear that the scrapie agent is not inactivated by the presence of ether at 32° to 36° C. for 10½ hours or by water at 94° to 98° C. for 24 hours. Thus this experiment demonstrates further the unusual resistance of the agent and suggests possible methods of producing more concentrated preparations.

Yours faithfully,
E. J. BUTLER,
W. SMITH.

Moredun Institute,
Gilmerton,
Edinburgh, 9.
May 5th, 1960.